location, high quality, considerable quantity, and structure permitting easy extraction are the four conditions assigned for the present predominance of Lake Superior ores.

The great preponderance of hematite among iron ores in this country is shown in the fact that for 1903 this type afforded 86.6 per cent. of the total production. The two leading producing regions at present are the Lake Superior district and the area about Birmingham, Alabama. The opinion of Van Hise is quoted, that the Lake Superior ores may be exhausted in the first half of the present century. The same authority looks forward to the marketing, in the near future, of ores running below 40 per cent. in iron. No other producing district in the world rivals the Superior region, which now affords at least three-fourths of the iron ore used in the United States. The current forming of limonite, or bog ore, is strikingly evidenced in the deposition, in Swedish ponds, of depths of 18 inches of this ore in periods varying from fifteen to thirty years.

It may surprise most readers to learn that the native copper of Michigan, as now mined, is contained in ores rarely running above 1 per cent. of native copper. Ninety per cent. of the copper of the United States comes from the States of Montana, Michigan, and Arizona, in the order named. Butte, in Montana, is the greatest producer in the world, the Anaconda mines alone yielding one-seventh of the world's supply. Butte began in 1887 to produce in excess of Lake Superior.

Fifty pages are devoted to gold and silver, including the silver-lead ores. Under aluminum, the bauxite localities are described, three in number: Georgia-Alabama, Arkansas, and New Mexico. The first was discovered in 1887, and the deposits have been worked since that time.

The book should be useful to a variety of readers, not only to students of economic geology, but to teachers of general geology and geography, and to all who are interested in the earth materials commonly used by man.

A. P. B.

The Geology of South Africa. By F. H. Hatch and G. S. Corstorphine. xiv and 348 pp. Macmillan & Co., London, 1905. (Price, $5.25.)

A related work, dealing with the geology of Cape Colony, was noticed by the present reviewer in the BULLETIN for December, 1905, page 753. The volume now noticed is of wider scope, but resembles the earlier work in being a summary account derived from many sources. Of the authors, Mr. Hatch has had wide connection with surveys in the British Empire, and Mr. Corstorphine was formerly Director of the Geological Survey of Cape Colony.

The beginnings of systematic South African geology are attributed to Andrew Geddes Bain, who died in 1864. The introductory chapter treats historically the growth of knowledge of that great region. The Transvaal began a survey in 1897 and Natal in 1898. The work suffered serious interruption in the years 1899-1903, the period of the war. The volume is adequately illustrated with sections, views, cuts of fossils, and maps. There is a folding map showing the geology of South Africa as a whole on the scale 78.88 miles=1 inch. There is also a large folding map of the formations of the Transvaal on the scale 19.7 miles=1 inch.

We find here what the work on Cape Colony lacks—namely, clear reference of the local formation names to the designations used in the world-wide

nomenclature of historical geology. Thus opposite page 33 is a folding tabular view giving the European equivalents, with successive parallel columns giving the formation names in Southern Cape Colony, Northern Cape Colony, Orange River Colony, Natal, Rhodesia, and the Transvaal. An extended bibliography is included, also an index of place-names and a general index.

The evidence of glaciation in Carboniferous times (*Devyka Conglomerate*) is given, but perhaps with less fulness than in the volume on Cape Colony. The same conclusions are ,however, fully accepted. The chapter on diamond-bearing deposits, following many sections of local geological descriptions, will, perhaps, have the most interest to the general reader. The diamonds are found in a serpentinous breccia, occurring in "pipes" which, with a more or less vertical altitude, penetrate the stratified rocks, whereas these gems are in many regions found in alluvial or washed beds.

The breccia is of volcanic origin, having been forced up through the sedimentary strata. The pipes contain many fragments of these inclosing bed-rocks which have been torn away in the violent ascent. The diamonds occur in many crystal combinations, and with a wide range of size. A remarkably large specimen, known as the Cullinan stone, found in January, 1905, near Pretoria, has a weight of 3,024¾ carats, equivalent to 1.37 lbs. avoirdupois. Some of the volcanic pipes, while resembling the rest in all other respects, yield no diamonds.

The first stone found was picked up on the bank of the Orange River in 1867 by a Dutch farmer. It was exhibited at the Paris Exposition, and ultimately purchased by the Governor of Cape Colony for the sum of $2,500. The surface area of the Kimberley mine comprises nearly 10½ acres, including 470 claims. In January, 1904, the main shaft had been sunk to a depth of 2,599 feet. Descriptions are given of the mines of Cape Colony, Orange River Colony, and the Transvaal.

As to the origin of the pipes, the authors favour the view that they are due to volcanic explosions, with abundant steam, accounting thus for the mud-like character of the mass. As to the origin of the gems themselves there seems to be much confusion of opinion. A. P. B.

First Report on the Relations between Climates and Crops. By Cleveland Abbe. U. S. Department of Agriculture, Weather Bureau. Bulletin No. 36. 8vo. Washington, D. C., 1905. Pp. 376. (Price, $1.50.)

There is always a very active interest on the part of the large portion of every community in the relations between climate and weather on the one hand and the yield and character of the crop on the other. This interest is not confined solely to farmers and meteorologists; it extends to that larger body of persons who are directly or indirectly affected by the harvest. Professor Cleveland Abbe, some years ago made a thorough and careful compilation and summary of the best published results on the whole subject of the relations of climate and crops up to the year 1891. This report, officially known as "No. 5119, Sig. 91," was ready for publication at that time, but for various reasons it could not then be printed. Having had the opportunity ourselves to look over Professor Abbe's paper some years ago, and having realized its importance from many points of view, we have been hoping for publication these past ten years. It is a pleasure to record the appearance of this report in print, as *Bulletin* No. 36 of the Weather Bureau. The words *First Report* at the beginning of the title are a pleasing indication that in time we may have a second report, bringing the subject up to date.